

THE ANNALS
AND
MAGAZINE OF NATURAL HISTORY.

No. 49. OCTOBER 1841.

IX.—*Observations on the Rodentia.* By G. R. WATERHOUSE,
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[With a Plate.]

[Continued from p. 600, vol. iii., N. S., of the Mag. Nat. Hist.]

Family VI. BATHYERGIDÆ.

THIS family appears to be entirely confined to Southern Africa, and is composed of but few known species, and these constitute the two genera *Bathyergus* of Illiger and *Orycterus* of F. Cuvier.

The situation which the *Bathyergidæ* should occupy among the Rodents is difficult to determine. They agree with the *Hystriees*, *Capromys*, *Echinmys*, &c. in having the descending ramus of the lower jaw thrown out from the *outer side* of the alveolar portion; but in the genera just mentioned the descending ramus is of a triangular form, and the posterior angle is produced and pointed. They moreover always have a large ant-orbital opening, the palate is almost always deeply emarginated behind, and the malar bone is deep and compressed. These and other characters which I shall have to notice in my next paper, I seek for in vain in the *Bathyergidæ*; and on the other hand, when I turn to the Murine or Sciurine groups, I do not find a single example in which, combined with other characters peculiar to those groups, the descending ramus of the lower jaw is *not* thrown out from the *under side* of the alveolar portion. Of the *Bathyergidæ* I am acquainted with but four species*, and of only two of these have I had an opportunity of examining the skulls, viz. *Bathyergus capensis* and *Orycterus maritimus*.

Their chief characters are as follows:—

Dentition.—Incisors broad; molars $\frac{3-3}{3-3}$ or $\frac{4-4}{4-4}$, subrooted, small, equal, or very nearly equal, in size, and the series on each side of each jaw parallel.

In *Bathyergus* the incisors of the upper jaw are less curved than in most Rodents, and remarkable for their great length,

* *Bathyergus capensis*, Desm., *B. cæcutiens*, Licht. (which is the *B. Hottentotus* of Lesson and Garn., and the *B. Ludwigi* of Dr. Smith), *B. Damarensis*, Ogilby, and *Orycterus maritimus*.

being extended backwards behind the last molars ; they are destitute of longitudinal grooves. The molars are $\frac{3-3}{3-3}$; the entering folds of enamel are very simple, there being but one external and one internal deep fold to each tooth.

In *Orycterus* the upper incisors are shorter and much more curved, and are furnished with a deep longitudinal groove in front ; those of the lower jaw are destitute of grooves, are very deep from front to back, and slightly concave at the sides. The molars are $\frac{4-4}{4-4}$, nearly cylindrical, but their antero-posterior diameter is the shortest, excepting in the front molar of the lower jaw. In the skulls before me the teeth are worn, and exhibit scarcely any trace of folds of enamel entering into the body of the tooth.

In both genera the enamel of the incisors is colourless, and the incisors of the lower jaw are extended backwards to the condyle.

The skull of the *Bathyergidæ* is rather broad, much contracted between the orbits, and (as in other Rodents which live for the most part underground*) the cranial cavity is proportionally small. The nasal bones are narrow and elongated. In *Orycterus* they are nearly of equal width throughout, whilst in *Bathyergus capensis* they are considerably broader behind than before. The anterior root of the zygomatic arch is formed entirely of the superior maxillary bone, and incloses a small ant-orbital opening : the lower boundary of the zygomatic process of the maxillary is slightly concave, so that the anterior portion of the zygomatic arch is slightly thrown up from the plane of the palate. This is more decidedly the case in *Bathyergus Capensis*, in which the ant-orbital foramen is rather larger. The malar bone is of moderate size, and is extended backwards so as to enter into the composition of the glenoid cavity. The portion of the palate situated between the molar teeth is remarkably contracted, and this part descends below the level of the anterior portion of the palate, and is continued some distance beyond the last molar. The incisive foramina are very small, and there are no openings in the posterior portion of the palate. The glenoid cavity of the temporal bone is very broad. In *Orycterus* the posterior portion of the malar bone forms a longitudinal ridge, which no doubt tends to restrain to a certain extent the lateral motion of the condyles of the lower jaw, but in *B. capensis* this ridge is wanting. The auditory bullæ are of moderate size—larger in *Orycterus maritimus* than in *B. capensis*. In the former animal the upper surface of the skull forms nearly a straight

* Compare the skull of the burrowing Marmots with that of their congeners the Squirrels, and that of *Spalax* with the Rats.

line in the longitudinal direction, being but slightly arched, and the plane of the occiput is vertical; whereas in *B. Capensis* the plane of the occiput is slightly oblique, receding from the upper part.

Lower Jaw.—The lower jaw has the descending ramus (*a*) Plate II, thrown out from the outer side of the alveolus of the inferior incisor (*b*).

In *Bathyergus Capensis* the descending ramus approaches somewhat to a semicircular form: its greatest extent is in the longitudinal direction of the jaw, and its greatest depth is beneath the condyle; in front it is curved suddenly upwards and inwards so as to form an obtuse angle at (*c*).

In *Orycterus maritimus* the descending ramus is thrown much more boldly out from the alveolar portion of the jaw, and is of very great extent; the lower part is curved inwards, and the posterior part is produced far beyond the line of the condyle, becoming gradually narrower towards the extremity.

The coronoid process is small in these two genera, and situated in a line with the last molar. The condyloid process is short, and the articular surface is large and rounded.

As regards the characters furnished by the skull and lower jaw, the present group is very isolated. In the structure of the molar teeth and in the contracted form of the palate between them, *Bathyergus* approaches most nearly to *Spalax**, but in other cranial characters there is a wide difference.

The skull of the animal figured by Dr. Ruppell under the name *Bathyergus splendens* agrees in most of its characters with that of *Spalax*, and in some respects links that genus with *Rhizomys*; here the ant-orbital foramen is of moderate

* I was induced, owing to the remarkable form of the lower jaw, to place *Spalax* near to *Geomys*, but upon re-examination I fear I have given too much weight to that character. This genus I have no doubt will prove an aberrant form of the *Muridæ*, and I think it will be more correct to regard the *Arvicolidæ* as constituting a subfamily of that group than as a section of equal importance. Since the publication of the former parts of this paper I have had an opportunity of examining several skulls belonging to species of these sections which I had not before seen. The skull of *Rhizomys* I was only acquainted with through Temminck's figure; the skull itself I have now examined, and I am quite satisfied that the animal belongs to the family *Muridæ*. The skull of *Ascomys mexicanus* I find agrees in all essential characters with that of *Geomys* (see fig. 71. p. 596, Mag. Nat. Hist. vol. iii. New Series). The differences between *Ascomys*, *Geomys*, *Diplostoma* (Richardson) and *Pseudostoma* are, it appears to me, not of sufficient importance to entitle them to rank as distinct genera. These genera or subgenera form a very natural little section of the *Arvicolidæ*, differing from the more typical species of that group in having $\frac{4-4}{4-4}$ molars, and these small and of very simple structure, and also in the absence of any ant-orbital foramen for the transmission of a portion of the masseter muscle: the very small slit found at the root of the zygoma in these animals evidently serves only to admit the passage of the ant-orbital nerve.

size and opens obliquely upwards, the coronoid process is long as in *Spalax*, the lower incisor runs backwards and outwards, and the thin layer of bone covering its base forms a protuberance (*d*) on the outer side of the condyle (*e*), in this respect resembling both *Rhizomys* and *Spalax*. The descending ramus springs from the under side of the alveolus of the inferior incisor, and not from the outer side, as in the true *Bathyergidæ*. The posterior part of the descending ramus is not directed outwards, as in *Spalax*; but is on the same plane as the horizontal ramus, as in *Rhizomys*. The molar teeth agree closely with those of *Spalax*, as well as with *Bathyergus*, being nearly cylindrical, of equal size, and having but one external and one internal fold of enamel; the incisors are proportionally broader than in *Spalax*.

The great difference between the skull of *Bathyergus splendens* and that of *Spalax typhlus* consists in the form of the occiput, it being vertical in the former, or very nearly so; but I very much suspect that the peculiar form of occiput which we observe in *Spalax typhlus* (which is the only species of the genus the skull of which I have seen) does not constitute a character indicative of affinity. I think it very likely to vary in the different species of the genus.

On the whole, it appears to me, that the animal called *Bathyergus splendens* by Ruppell should be removed from the genus in which he has placed it, and might be arranged either with the species of *Spalax* or perhaps between that genus and *Rhizomys*, and I think it probable Rodents may hereafter be found connecting the *Bathyergidæ* with these genera.

EXPLANATION OF PLATE II.

Fig. 1. Skull of *Orycterus maritimus*.

- 1 a. Under side of do.
- 1 b. Under side of lower jaw.
 - a. Descending ramus.
 - b. Alveolus of incisor.
- 1 c. Lower jaw viewed from above.
- 1 d. Side view of do.

Fig. 2. *Bathyergus capensis*.

Fig. 2 a. Lower jaw of *Bathyergus capensis*, viewed from beneath.

2 b. Side view of do.

Fig. 3. *Bathyergus splendens* of Ruppell.

3 a. Side view of skull.

3 b. Lower jaw, view from above.

d. Termination of incisor.

e. Condyle.

X.—*Observations* on the Functions performed by the Hairs on the Stigma in Campanulacæ, Compositæ, and other Plants.* By ARTHUR HILL HASSALL, M.R.C.S.L., Corresponding Member of the Dublin Natural History Society.

I HAVE read with much interest some observations by M. Adolphe Brongniart on the 'Functions of the Hairs on the

* The principal of these observations were written during the summer of last year.